IPL SEQUENCE DECODED BY R. QUINN

FORMAT OF DISASSEMBLY -

EACH MACHINE CODE INSTRUCTION IS DISASSEMBLED AND PRINTED OUT ON TWO OR MORE LINES. THE FIRST LINE DISPLAYS THE START ADDRESS OF THE INSTRUCTION IN DECIMAL THEN HEX THEN, ON THE SAME LINE, THE CONTENT BYTE OF THAT ADDRESS IN HEX THEN DECIMAL.

THE OPCODE AND OPERAND THAT ARE THE ASSEMBLER LANGUAGE INTERPRETATION OF THE INSTRUCTION WILL APPEAR ON THE NEXT LINE. DIGITS OR LETTER CHARACTERS A TO F THAT APPEAR IN THE OPERAND PRECEDED BY A HASH SIGN (#) ARE HEX NUMBERS.

LETTER CHARACTERS IN THE OPERAND THAT ARE NOT PRECEDED BY A HASH SIGN ARE REGISTERS OR, IN THE CASE OF JUMP INSTRUCTIONS, FLAG CONDITIONS.

NUMBERS IN THE OPERAND THAT ARE PRECEDED BY A DOLLAR SIGN ($) ARE DECIMAL NUMBERS.

THE BYTE OR BYTES OF THE OPERAND, IF SUCH THERE BE, WILL DISPLAY ON SUCCESSIVE LINES WITH THEIR DECIMAL ADDRESSES. COMPLETION OF THE DISASSEMBLY OF AN INSTRUCTION IS MARKED BY A LINE OF DASHES.

USING INFO FROM IPL SEQUENCE —

ON PAGE 26/21 ON IPL SEQUENCE DECODING IN THIS ISSUE YOU'LL NOTE ADDRESSES 181 TO 189 INCLUSIVE HAVE 9 NOP INSTRUCTIONS WHICH CAN BE UTILISED. WITH ROBERT'S HELP I'VE PLACED FOUR BYTES THERE WHICH PERFORM AN OUT 32,8 FUNCTION UPON POWER UP OR RESET. AS ONLY FOUR BYTES WERE USED THAT MEANS THERE ARE FIVE BYTES LEFT THAT COULD BE USED TO ADD OTHER FUNCTIONS.

DECIMAL ADDRESS	OLD BYTE	NEW BYTE		
181	0	62	;	LD A
182	0	8	;	8
183	0	211	;	OUT
184	0	32	;	(32),A
185	0	0		
186	0	0		
187	0	0		
188	0	0		
189	0	0		

A VZ MODIFIED FOR SUPER HI-RES GRAPHICS POWERS UP OR RESETS IN GRAPHICS MODE(0) WITH ONLY 1K (1024) BYTES VIDEO MEMORY AVAILABLE. THE USER HAS TO DO AN OUT 32,8 FUNCTION TO PUT THE VZ INTO GRAPHICS MODE(2) WHICH IS THE STANDARD MODE GIVING 2K (2048) BYTES FOR HI-RES GRAPHICS. SO HAVING THE VZ DO AN OUT 32,8 AUTOMATICALLY FOR USER IS A BIG ADVANTAGE.

NOTE - AS THE ADDRESSES 181 TO 189 ARE IN ROM POKEING WILL NOT CHANGE ANY BYTE AND ONLY THOSE PERSONS WITH AN EPROM PROGRAMMER OR BATTERY BACKED RAM WILL BE ABLE TO MODIFY THEIR ROMS.

IPL SEQUENCE DECODING CONTINUED . . 26/20

THE INITIAL PROGRAM LOADER (IPL) SEQUENCE EXECUTES WHEN VZ IS SWITCHED ON

0	00	F3	243	INTERRUPTS DISABLED
DI				
1	01	AF	175	ZERO THE ACCUMULATOR
XOR		A		
2	02	32	50	RAM LOCATION
LD		(#6800),A		
3		00	0	#6800 = 26624:
4		68	104	IS ZEROED
5	05	C3	195	#0674 = 1652:
JP		#0674		
6		74	116	JUMP TO CONTINUE THE
7		06	6	IPL SEQUENCE
1652	674	00	0	
NOP				
1653	675	00	0	
NOP				
1654	676	21	33	SETTING UP FOR A COPY
LD		HL,#06D2		
1655		D2	210	FROM ROM STARTING AT
1656		06	6	#06D2 = 1746,
1657	679	11	17	TO RAM
LD		DE,#7800		
1658		00	0	#7800 = 30720: IS START
1659		78	120	OF COMMUNICATIONS REGION
1660	67C	01	1	OF 54 BYTES
LD		BC,#0036		
1661		36	54	#6D2 TO #707 WILL COPY
1662		00	0	INTO #7800 TO 7835
1663	67F	ED	237	SEE COMMUNICATIONS REGION
LDIR				
1664		B0	176	SUPPLEMENT IN ISSUE 20
1665	681	3D	61	A = 255 WHEN DECREMENTED
DEC		A		
1666	682	3D	61	FROM ZERO:DECREMENT TWICE
DEC		A		
1667	683	20	32	JUMP TO 1654 AND REPEAT
JR		NZ,$ -15		
1668		F1	241	COPY IF REGISTER A NOT 0
1669	685	06	6	COPY REPEATED 128 TIMES!
LD		B,#27		
1670		27	39	39 LOCATIONS FROM #7836
1671	687	12	18	WILL BE ZEROED
LD		(DE),A		
1672	688	13	19	IN COMMUNICATIONS REGION
INC		DE		
1673	689	10	16	JUMP TO 1671
DJNZ		$ -4		
1674		FC	252	ZERO #7836 TO #785C
1675	68B	C3	195	SEE COM.REGION SUPPLEMENT
JP		#0075		
1676		75	117	#0075 = 117: JUMP AND
1677		00	0	CONTINUE IPL SEQUENCE
117	75	11	17	#7880 = 30848: START LOC.
LD		DE,#7880		
118		80	128	IN COMMUNICATIONS REGION
119		78	120	FOR ANOTHER COPY
120	78	21	33	FROM ROM, BEGINNING AT
LD		HL,#18F7		
121		F7	247	#18F7 = 6391
122		18	24	
123	7B	01	1	OF 39 BYTES: WILL COPY
LD		BC,#0027		
124		27	39	INITIALISATION DATA IN
125		00	0	ROM #18F7 TO #191D
126	7E	ED	237	TO COMMUNICATIONS REGION:
LDIR				
127		B0	176	#7880 TO #78A6
128	80	21	33	CONTINUE INITIALISATION
LD		HL,#79E5		
129		E5	229	OF COMMUNICATIONS REGION
130		79	121	#79E5 = 31205
131	83	36	54	PUT ASCII CODE FOR COLON
LD		(HL),#3A		
132		3A	58	IN LOCATION 31205
133	85	23	35	HL = 31206
INC		HL		
134	86	70	112	PUT ZERO IN 31206
LD		(HL),B		
135	87	23	35	
INC		HL		
136	88	36	54	PUT ASCII CODE FOR COMMA
LD		(HL),#2C		
137		2C	44	IN LOCATION 31207
138	8A	23	35	HL = 31208
INC		HL		

139	8B	22	34	#78A7 = 30887: KEYBOARD
LD		(#78A7),HL		
140		A7	167	BUFFER POINTER SET TO
141		78	120	START OF INPUT BUFFER
142	8E	11	17	#012D = 301: IS ADDRESS
LD		DE,#012D		
143		2D	45	FIELD FOR JP #12D
144		01	1	28 JUMPS WILL BE SET UP
145	91	06	6	IN COMMUNICATIONS REGION
LD		B,#1C		
146		1C	28	FROM 31058 TO 31141:JUMPS
147	93	21	33	TO ERROR MESSAGE IF TRS80
LD		HL,#7952		
148		52	82	DISK COMMAND TOKENS USED
149		79	121	#7952 = 31058: IS START
150	96	36	54	OF DISK BASIC EXITS IN
LD		(HL),#C3		
151		C3	195	THE COMMUNICATIONS REGION
152	98	23	35	#C3 = 195 IS MACHINE CODE
INC		HL		
153	99	73	115	FOR UNCONDITIONAL JUMP
LD		(HL),E		
154	9A	23	35	
INC		HL		
155	9B	72	114	
LD		(HL),D		
156	9C	23	35	
INC		HL		
157	9D	10	16	JUMP TO 150
DJNZ		$ -9		
158		F7	247	LOOP 28 TIMES
159	9F	06	6	21: LOOP COUNT FOR
LD		B,#15		
160		15	21	TRS-80 DOS EXIT RETURNS
161	A1	36	54	STARTING AT 31142,
LD		(HL),#C9		
162		C9	201	INITIALISE 21 RETURNS
163	A3	23	35	THE FIRST TWO RETURNS ARE
INC		HL		
164	A4	23	35	FOR DISK BASIC EXITS
INC		HL		
165	A5	23	35	DOS EXIT RETURNS BEGIN AT
INC		HL		
166	A6	10	16	31148
DJNZ		$ -7		
167		F9	249	JUMP TO 161:LOOP 21 TIMES
168	A8	21	33	#7AE8 = 31464: IS LAST
LD		HL,#7AE8		
169		E8	232	LOCATION IN COM. REGION
170		7A	122	ZERO THIS LOCATION
171	AB	70	112	BECAUSE BASIC PROGRAMS
LD		(HL),B		
172	AC	31	49	REQUIRE 0 START TO RUN
LD		SP,#79F8		
173		F8	248	#79F8 = 31224: IS
174		79	121	TEMPORARY START OF STACK
175	AF	CD	205	DURING IPL SEQUENCE
CALL		#1B8F		
176		8F	143	#1B8F = 7055: INITIALISE
177		1B	27	BASIC POINTERS/VARIABLES
178	B2	CD	205	
CALL		#01C9		
179		C9	201	#01C9 = 457: TO CLEAR
180		01	1	THE SCREEN
181	B5	00	0	THESE NOP INSTRUCTIONS
NOP				
182	B6	00	0	WERE THE LOCATION OF A
NOP				
183	B7	00	0	TRS-80 USER INPUT MEMORY
NOP				
184	B8	00	0	SIZE ROUTINE THAT HAS
NOP				
185	B9	00	0	BEEN OBLITERATED FROM THE
NOP				
186	BA	00	0	VZ OPERATING SYSTEM
NOP				
187	BB	00	0	
NOP				
188	BC	00	0	
NOP				
189	BD	00	0	
NOP				

IPL SEQUENCE DECODING CONTINUED . . 26/22

190	BE	18	24	JUMP TO 196
JR		$ +4		
191		04	4	
192	C0	D7	215	NOT PART OF VZ IPL
RST		#10		
193	C1	B7	183	NOT PART OF VZ IPL
OR		A		
194	C2	20	32	
JR		NZ,$ +18		
195		12	18	NOT PART OF VZ IPL
196	C4	21	33	#7B4C = 31564: SETTING UP
LD		HL,#7B4C		
197		4C	76	FOR A ROUTINE TO
198		7B	123	DETERMINE MEMORY SIZE
199	C7	23	35	STARTING AT 31565 IN RAM
INC		HL		
200	C8	7C	124	AND WORKING TOWARD 65535
LD		A,H		
201	C9	B5	181	(MAXIMUM ADDRESSABLE
OR		L		
202	CA	28	40	MEMORY FOR VZ), TESTING
JR		Z,$ +27		
203		1B	27	FOR PRESENCE OF RAM
204	CC	7E	126	GET BYTE AT CURRENT LOC.
LD		A,(HL)		
205	CD	47	71	BEING TESTED AND SAVE IT
LD		B,A		
206	CE	2F	47	COMPLEMENT IT & WRITE NEW
CPL				
207	CF	77	119	BYTE TO TEST LOCATION
LD		(HL),A		
208	D0	BE	190	CHECK IF WRITE SUCCEEDED
CP		(HL)		
209	D1	70	112	RESTORE ORIGINAL BYTE
LD		(HL),B		
210	D2	28	40	IF TEST LOCATION EXISTS,
JR		Z,$ -13		
211		F3	243	JUMP TO 199 & TEST NEXT
212	D4	18	24	JUMP TO 231 BECAUSE
JR		$ +17		
213		11	17	CURRENT TEST LOC. ABSENT
231	E7	2B	43	WE HAVE TOP OF RAM
DEC		HL		
232	E8	11	17	#7C14 = 31764: USE THIS
LD		DE,#7C14		
233		14	20	AS MINIMUM REQUIRED RAM
234		7C	124	AND GO TEST THAT MINIMUM
235	EB	DF	223	RAM NOT LESS THAN 31764
RST		#18		
236	EC	DA	218	#197A = 6522: JUMP TO
JP		C,#197A		
237		7A	122	INSUFFICIENT MEMORY ROUT-
238		19	25	INE IF MINIMUM RAM LESS
239	EF	11	17	ELSE CONTINUE IPL
LD		DE,#FFCE		
240		CE	206	#FFCE = 65486:-
241		FF	255	DEFAULT SIZE (50) FOR
242	F2	22	34	STRING SPACE (65536-50)
LD		(#78B1),HL		
243		B1	177	#78B1 = 30897: SET
244		78	120	TOP OF RAM POINTER
245	F5	19	25	
ADD		HL,DE		
246	F6	22	34	#78A0 = 30880: SET LOWER
LD		(#78A0),HL		
247		A0	160	BOUNDARY OF STRING SPACE
248		78	120	IN POINTER 30880/1
249	F9	CD	205	#1B4D = 6989: GO AND
CALL		#1B4D		
250		4D	77	INITIALISE ALL BASIC
251		1B	27	POINTERS AND VARIABLES
252	FC	CD	205	#3484 = 13444:
CALL		#3484		
253		84	132	SEE DISASSEMBLY AT END
254		34	52	OF THIS PRINTOUT
255	FF	21	33	#010F = 271: IS START OF
LD		HL,#010F		
256		0F	15	VIDEO TECHNOLOGY MESSAGE
257		01	1	
258	102	CD	205	#28A7 = 10407: TO MESSAGE
CALL		#28A7		
259		A7	167	OUTPUT ROUTINE
260		28	40	

```
 261   105   ED        237
IM          1
 262          56        86        SET INTERRUPT MODE 1 CONDITION--A RST #38 EXECUTES IF AN INTERRUPT OCCURS
-----------------------------
 263   107   C3        195
JP          #068E
 264          8E       142        CONTINUE IPL SEQUENCE FROM #68E
 265          06         6
-----------------------------
-----------------------------
 1678  68E   21         33
LD          HL,#4000
 1679         00         0        #4000 = 16384  IS START OF DOS ROM IF DISK DRIVE INSTALLED
 1680         40        64
-----------------------------

 1681  691   CD        205        GO AND CHECK FOR PRESENCE OF DOS BY TESTING IDENTITY OF FIRST FOUR BYTES FROM 1638
CALL        #06A4
 1682         A4       164        IF TEST REVEALS PRESENCE OF DOS, THE CHECKING SUBROUTINE WILL NOT RETURN
 1683         06         6        INSTEAD, A JUMP TO DOS IPL SEQUENCE WILL BE EXECUTED
-----------------------------
 1684  694   21         33        NO DOS, SO RETURN HERE
LD          HL,#6000
 1685         00         0        #6000 = 24576 IS THE START OF THE 2K LOCATED ABOVE DOS ROM
 1686         60        96
-----------------------------
 1687  697   CD        205        GO AND CHECK FOR PRESENCE OF FOUR IDENTITY BYTES FROM 24576
CALL        #06A4
 1688         A4       164        IF ALL BYTES FOUND THEN CHECKING ROUTINE WILL NOT RETURN
 1689         06         6        INSTEAD A JUMP TO 24580 WILL BE EXECUTED
-----------------------------
 1690  69A   21         33        #8000 = 32768  IS USUALLY AN ADDRESS IN PROGRAM (RAM) MEMORY
LD          HL,#8000
 1691         00         0
 1692         80       128
-----------------------------
 1693  69D   CD        205        GO AND CHECK FOR PRESENCE OF FOUR IDENTITY BYTES FROM 32768
CALL        #06A4
 1694         A4       164        UNLESS ROM OR EPROM HAS BEEN INSTALLED FROM 32768 WITH THE FOUR IDENTITY BYTES,
 1695         06         6        THE TEST WILL FAIL AND CHECKING SUBROUTINE WILL RETURN TO CALLER
-----------------------------
 1696  6A0   FB        251        INTERRUPTS WILL BE ENABLED
EI
-----------------------------
 1697  6A1   C3        195        AND THE IPL SEQUENCE WILL END WITH A JUMP TO READY ROUTINE
JP          #1A19
 1698         19         25       YOUR VZ IS SET UP FOR YOUR USE
 1699         1A         26
-----------------------------
-----------------------------
```

CONTINUED NEXT ISSUE . . . . . .

TEST SUBROUTINE FOR PRESENCE OF CODE SEQUENCE--FOUR BYTES

1700	6A4	3E	62	
LD		A,$AA		
1701		AA	170	170 IS THE FIRST TEST BYTE
1702	6A6	BE	190	IS BYTE AT ADDRESS IN HL REGISTERS = 170?
CP		(HL)		
1703	6A7	23	35	NEXT ADDRESS
INC		HL		
1704	6A8	C0	192	RETURN IF BYTE IS NOT '170'
RET		NZ		
1705	6A9	2F	47	ELSE COMPLEMENT BYTE IN ACCUMULATOR
CPL				
1706	6AA	BE	190	IS BYTE AT SECOND ADDRESS IN HL REGISTERS = NEW BYTE IN ACCUMULATOR?
CP		(HL)		
1707	6AB	23	35	NEXT ADDRESS
INC		HL		
1708	6AC	C0	192	RETURN IF BYTES ARE NOT EQUAL
RET		NZ		
1709	6AD	3E	62	'231' IS THE THIRD TEST BYTE
LD		A,$E7		
1710		E7	231	
1711	6AF	BE	190	IS BYTE AT THIRD ADDRESS IN HL REGISTERS = '231'?
CP		(HL)		
1712	6B0	23	35	FOURTH AND FINAL ADDRESS
INC		HL		
1713	6B1	C0	192	RETURN IF BYTES ARE NOT EQUAL
RET		NZ		
1714	6B2	2F	47	ELSE COMPLEMENT BYTE IN ACCUMULATOR
CPL				
1715	6B3	BE	190	AND COMPARE IT WITH BYTE AT ADDRESS IN HL REGISTERS
CP		(HL)		
1716	6B4	23	35	ADDRESS IN HL REGISTERS IS NOW FIRST ADDRESS BEYOND FOUR TEST LOCATIONS
INC		HL		
1717	6B5	C0	192	RETURN IF TWO BYTES ARE NOT EQUAL
RET		NZ		
1718	6B6	FB	251	ELSE ENABLE INTERRUPTS
EI				
1719	6B7	E9	233	AND JUMP TO ADDRESS IN HL REGISTERS--THE IPL SEQUENCE IS TERMINATED
JP		(HL)		

CALLED FROM #F9

```
 6989  1B4D      2A        42   #78A4 = 30884:
LD              HL,(#78A4)
 6990            A4       164   GET START OF PROGRAM
 6991            78       120   FROM COM. REGION POINTER
-----------------------------
 6992  1B50      CD       205
CALL            #1DF8
 6993            F8       248   #1DF8 = 7672:
 6994            1D        29   TO TURN TRACE OFF
=============================
 6995  1B53      32        50
LD              (#78E1),A
 6996            E1       225   #78E1 = 30945: ZERO THE
 6997            78       120   AUTO INPUT FLAG--NO AUTO
-----------------------------
 6998  1B56      77       119   ZERO THE FIRST TWO CELLS
LD              (HL),A
-----------------------------
 6999  1B57      23        35   OF PROGRAM MEMORY--31465
INC             HL
-----------------------------
 7000  1B58      77       119   AND 31466, THEN
LD              (HL),A
-----------------------------
 7001  1B59      23        35   SET POINTER TO START OF
INC             HL
-----------------------------
 7002  1B5A      22        34   VARIABLE LIST TABLE --
LD              (#78F9),HL
 7003            F9       249   #78F9 = 30969: TO 31467,
 7004            78       120   AS END OF PROGRAM
-----------------------------
 7005  1B5D      2A        42   RECOVER START OF (NULL)
LD              HL,(#78A4)
 7006            A4       164   PROGRAM FROM POINTER
 7007            78       120   #78A4 = 30884
-----------------------------
 7008  1B60      2B        43   BACKSPACE TO 31464--LAST
DEC             HL
-----------------------------
 7009  1B61      22        34   LOCATION IN COM. REGION
LD              (#78DF),HL
 7010            DF       223   #78DF/E0 IS POINTER TO
 7011            78       120   PROGRAM START WHEN RUN
-----------------------------
 7012  1B64      06         6   LOAD 26 CELLS IN COM.REG.
LD              B,#1A
 7013            1A        26   FOR VARIABLE DECLARATION
-----------------------------
 7014  1B66      21        33   TABLE, STARTING AT
LD              HL,#7901
 7015            01         1   #7901 = 30977: WITH '4'
 7016            79       121   CODE FOR SINGLE PRECISION
-----------------------------
 7017  1B69      36        54   VARIABLE DECLARATION
LD              (HL),#04
 7018            04         4   TABLE [illegible] AL--
-----------------------------
 7019  1B6B      23        35   ONE ENTRY FOR EACH ALPHA
INC             HL
-----------------------------
 7020  1B6C      10        16   CHARACTER.  LOOP UNTIL
DJNZ            $ -5
 7021            FB       251   JUMP TO 7017 TABLE DONE
=============================
 7022  1B6E      AF       175   ZERO ACCUMULATOR
XOR             A
-----------------------------
 7023  1B6F      32        50   #78F2 = 30962:
LD              (#78F2),A
 7024            F2       242   FLAG NO ERROR FOR RESUME
 7025            78       120
-----------------------------
 7026  1B72      6F       111   ZERO
LD              L,A
-----------------------------
 7027  1B73      67       103   HL REGISTERS
LD              H,A
-----------------------------
 7028  1B74      22        34   #78F0 = 30960:
LD              (#78F0),HL
 7029            F0       240   ZERO ON ERROR ADDRESS IN
 7030            78       120   #78F0/F1 OF COM. REGION
-----------------------------
 7031  1B77      22        34   #78F7 = 30967: ZERO
LD              (#78F7),HL
 7032            F7       247   POINTER TO NEXT STATEMENT
 7033            78       120   FOLLOWING BREAK,STOP,END
-----------------------------
 7034  1B7A      2A        42   #78B1 = 30897:
LD              HL,(#78B1)
 7035            B1       177   GET TOP OF MEMORY
 7036            78       120
-----------------------------
 7037  1B7D      22        34   #78D6 = 30934: LOAD
LD              (#78D6),HL
 7038            D6       214   POINTER TO NEXT AVAILABLE
 7039            78       120   PLACE IN STRING SPACE
-----------------------------
 7040  1B80      CD       205   #1D91 = 7569:
CALL            #1D91
 7041            91       145   CALL RESTORE ROUTINE TO
 7042            1D        29   PUT 31464 IN DATA POINTER
=============================
 7043  1B83      2A        42   #78F9 = 30969:
LD              HL,(#78F9)
 7044            F9       249   GET END OF BASIC PROGRAM-
 7045            78       120   PREVIOUSLY SET TO 31467
-----------------------------
 7046  1B86      22        34   #78FB = 30971: SET END
LD              (#78FB),HL
 7047            FB       251   SIMPLE VARIABLES POINTER
 7048            78       120   EQUAL TO END OF PROGRAM
-----------------------------
 7049  1B89      22        34   #78FD = 30973:
LD              (#78FD),HL
 7050            FD       253   LIKEWISE WITH END OF
 7051            78       120   ARRAY VARIABLES POINTER
-----------------------------
```

IPL SEQUENCE DECODING CONTINUED . . 27/26

CALLED FROM #FC IN IPL SEQUENCE

13444	3484	CD	205	#3FA0 = 16288: TO CHECK
CALL		#3FA0		
13445		A0	160	IF CTRL KEY WAS HELD DOWN
13446		3F	63	WHEN VZ WAS SWITCHED ON
13447	3487	3E	62	32 IS GREEN SCREEN CODE
LD		A,#20		
13448		20	32	
13449	3489	32	50	#783B = 30779: LOAD GREEN
LD		(#783B),A		
13450		3B	59	SCREEN CODE INTO 30779
13451		78	120	
13452	348C	32	50	ALSO LOAD '32' INTO
LD		(#6800),A		
13453		00	0	#6800 = 26624
13454		68	104	
13455	348F	3E	62	
LD		A,#3C		
13456		3C	60	
13457	3491	32	50	#783A = 30778: LOAD
LD		(#783A),A		
13458		3A	58	WITH '60'
13459		78	120	
13460	3494	3E	62	16 IS CURSOR FLASH COUNT
LD		A,#10		
13461		10	16	
13462	3496	32	50	#7841 = 30785: PUT COUNT
LD		(#7841),A		
13463		41	65	IN CURSOR FLASH COUNTER
13464		78	120	RANGE 16 TO 1
13465	3499	AF	175	ZERO ACCUMULATOR
XOR		A		
13466	349A	32	50	
LD		(#7AAF),A		
13467		AF	175	#7AAF = 31407: ZERO THIS
13468		7A	122	LOCATION IN COM. REGION
13469	349D	21	33	
LD		HL,#7AB2		
13470		B2	178	#7AB2 = 31410
13471		7A	122	
13472	34A0	22	34	
LD		(#7AB0),HL		
13473		B0	176	#7AB0 = 31408: LOAD 31410
13474		7A	122	INTO 31408/9
13475	34A3	3E	62	
LD		A,#C9		
13476		C9	201	
13477	34A5	C3	195	
JP		#3E37		
13478		37	55	
13479		3E	62	

15927	3E37	32	50	
LD		(#787D),A		
15928		7D	125	#787D = 30845: LOAD THE
15929		78	120	INTERRUPT EXIT IN THE
15930	3E3A	3E	62	COM. REGION WITH RET CODE
LD		A,#10		
15931		10	16	16 IS CODE FOR YELLOW
15932	3E3C	32	50	#7846 = 30790: PUT YELLOW
LD		(#7846),A		
15933		46	70	CODE IN GRAPHIC CHARACTER
15934		78	120	COLOR STORE
15935	3E3F	C9	201	RETURN TO #FF
RET				

CALLED FROM #1B50

7672	1DF8	AF	175	ZERO ACCUMULATOR
XOR		A		
7673	1DF9	32	50	#791B = 31003:
LD		(#791B),A		
7674		1B	27	SET TRACE FLAG IN COM.
7675		79	121	REGION TO OFF -- TROFF
7676	1DFC	C9	201	RETURN TO #1BF3
RET				

```
7052  1B8C    CD     205   #79BB = 31163: DOS EXIT
CALL        #79BB
7053          BB     187   IN COMMUNICATIONS REGION
7054          79     121   IPL INITIALISED TO RET
==============================
7055  1B8F    C1     193   NO PREVIOUS PUSH--TRIVIAL
POP         BC
------------------------------
7056  1B90    2A      42   #78A0 = 30880: GET LOWER
LD          HL,(#78A0)
7057          A0     160   BOUNDARY OF STRING SPACE
7058          78     120
------------------------------
7059  1B93    2B      43   DECREMENT TWICE AND PUT
DEC.        HL
------------------------------
7060  1B94    2B      43   RESULT IN BACKSPACED
DEC         HL
------------------------------
7061  1B95    22      34   STACK ADDRESS STORE
LD          (#78EB),HL
7062          E8     232   #78E8 = 30952
7063          78     120
------------------------------
7064  1B98    23      35   INCREMENT
INC         HL
------------------------------
7065  1B99    23      35   TWICE TO RESTORE ORIGINAL
INC         HL
------------------------------
7066  1B9A    F9     249   VALUE AND PUT THIS IN
LD          SP,HL
------------------------------
7067  1B9B    21      33   Z80 STACK POINTER
LD          HL,#78B5
7068          B5     181   REGISTER
7069          78     120
------------------------------
7070  1B9E    22      34   #78B3 = 30899: THEN PUT
LD          (#78B3),HL
7071          B3     179   IN POINTER TO LITERAL
7072          78     120   STRING POOL: INITIALISED
------------------------------
7073  1BA1    CD     205   #038B = 907: TO SET
CALL        #038B
7074          8B     139   OUTPUT DEVICE TO VIDEO
7075          03       3
==============================
7076  1BA4    CD     205   #2169 = 8553: ALSO SETS
CALL        #2169
7077          69     105   OUTPUT DEVICE TO VIDEO
7078          21      33   SOME REDUNDANCY HERE
==============================
7079  1BA7    AF     175   ZERO ACCUMULATOR
XOR         A
------------------------------
7080  1BA8    67     103   THEN ZERO
LD          H,A
------------------------------
7081  1BA9    6F     111   HL REGISTERS
LD          L,A
------------------------------
7082  1BAA    32      50   #78DC = 30940:
LD          (#78DC),A
7083          DC     220   ZERO 'FOR' STATEMENT FLAG
7084          78     120
------------------------------
7085  1BAD    E5     229
PUSH        HL
------------------------------
7086  1BAE    C5     197
PUSH        BC
------------------------------
7087  1BAF    2A      42   #78DF = 30943:
LD          HL,(#78DF)
7088          DF     223   GET START ADDRESS OF
7089          78     120   PROGRAM WHEN RUN (31464)
------------------------------
7090  1BB2    C9     201   RETURN TO #FC
RET
==============================
```

CALLED FROM #3484: SUBROUTINE TO CHECK IF <CTRL> WAS PRESSED WHEN VZ SWITCHED ON

16288 3FA0	3A	58	#68FD = 26877
LD	A,(#68FD)		
16289	FD	253	GET BYTE FROM ROW ADDRESS IN KEYBOARD MATRIX
16290	68	104	THAT INCLUDES CTRL KEY
16291 3FA3	CB	203	
BIT	2 ,A		
16292	57	87	CHECK FOR PRESS OF <CTRL> WHILE VZ IS BEING SWITCHED ON
16293 3FA5	3E	62	LOAD ACCUMULATOR WITH DARK SPACE CHARACTER CODE--DARK CHARACTER FOR LIGHT SCREEN
LD	A,#20		
16294	20	32	THIS IS A PEEK/POKE CODE
16295 3FA7	20	32	JUMP TO 16305 IF <CTRL> IS NOT BEING PRESSED
JR	NZ,$ +8		
16296	08	8	BIT 2 OF 26877 WILL BE ZERO IF <CTRL> IS PRESSED
16297 3FA9	F6	246	<CTRL> PRESSED, SO CHANGE CODE TO '96'
OR	#40		
16298	40	64	WHICH IS LIGHT SPACE CHARACTER CODE AND DARK SCREEN CODE
16299 3FAB	32	50	#7818 = 30744: LOCATIONS 30744/5 IN COMMUNICATIONS REGION WERE INITIALLY LOADED
LD	(#7818),A		
16300	18	24	WITH ZERO BYTES AT START OF IPL SEQUENCE
16301	78	120	CHANGE SCREEN FLAG TO DARK, SINCE <CTRL> WAS PRESSED
16302 3FAE	32	50	#7819 = 30745: CHANGE SCREEN CHARACTER FLAG TO LIGHT --
LD	(#7819),A		
16303	19	25	LIGHT CHARACTERS ON A DARK SCREEN
16304	78	120	
16305 3FB1	32	50	AND LOAD CURSOR CHARACTER STORE IN COMMUNICATIONS REGION WITH
LD	(#783C),A		
16306	3C	60	SPACE CHARACTER CODE
16307	78	120	#783C = 30780
16308 3FB4	C3	195	
JP	#01C9		
16309	C9	201	#01C9 = 457:
16310	01	1	JUMP TO ROUTINE TO CLEAR SCREEN, HOME CURSOR AND SELECT MODE(0)